

REMARKS

Objections to and Rejections of the Claims

Claims 1-22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Tandon (patent number 5,485,573) in view of Chung et al. (patent number 6,195,760).

Tandon, in summary, is directed to a method for gathering more and better information into dump files, in a multi-host computing environment. When a failure occurs on one host, Tandon gathers a dump file from each host that is operating in the multi-host environment. This avoids the problem where a dump file was collected from only the host that encounters the error. Chung discloses that a backup system can be used to take over for a primary system when the primary system has a failure.

Independent claim 1 recites the step of preserving the state of a first set of system resources after a failure occurs in a computer system. Claim 1 further recites the step of diagnosing the failure by analyzing one or more resources from the first set of system resources.

Addressing each of the Office Action's rejections in turn, Claim 1 stands rejected over Tandon, in view of Chung and an "Official Notice". Firstly, the Office Action states that Tandon teaches diagnosing the failure by analyzing one or more resources from the first set of resources. The disclosure in Tandon, however, teaches diagnosing a failure by copying or recording the contents of allocated memory to a file, and then performing an analysis on the dump file copy stored in that file later on (col 2, lines 40-49). Claim 1, in contrast, recites the analysis of the resources themselves, by preserving them in the computer system the resources belong to. Nowhere does Tandon disclose, teach, or suggest preserving the state of the system resource (as opposed to copying the state of the resource), and then analyzing the system resource itself.

Claim 1 also stands rejected over Tandon in view of Chung, since the Office Action asserts that the combined references teach the idea of using a second set of resources to access a first set of resources for the purpose of analyzing the first set of resources. Chung discloses the idea of having a backup computer system available to take over the running of applications from a primary computer, when the primary computer suffers a failure. Chung does not teach, however, the idea of

using a second set of resources to access the first set of resources for purposes of analyzing the first set of resources. In Chung, the backup computer does not analyze the primary computer. The backup computer merely takes over the processing of the data from the primary computer.

The Office Action also rejects Claim 1 by taking "Official Notice" of the fact that preserving the state of system resources is well-known in the art, and it would therefore be obvious to preserve system resources for analysis, and then use the systems of Tandon and Chung to analyze the failure. Applicants concede that the idea of copying the contents of system resources to a dump file, and then performing an analysis on that dump file, is well known in the art. Claim 1, however, is directed to preserving the state of the system resources themselves. In the system of Tandon, once the state of the system resources has been recorded or copied into the dump file, the various system resources of the computer system proceed onward in their normal operations. In the approach recited in claim 1, the state of the various system resources is preserved in place, in the computer system itself – and the preserved system resources can then be analyzed to diagnose the failure. This is substantially different from merely recording the state of the computer resources into a dump file and thereafter analyzing the dump file. If the Examiner still believes that this aspect of claim 1 is well-known in the art, Applicants respectfully request a particular cite to a prior art reference that teaches this idea.

For at least these reason, Applicants respectfully submit that claim 1 is allowable over the cited references. For at least these reasons, claims 2-22 are likewise allowable over the cited references. However, each of these claims 2-22 are further discussed below to particularly point out additional reasons for patentability.

Claim 2 stands rejected over Tandon because the Office Action states that Tandon teaches maintaining one or more lists of the first set of system resources. The system of Tandon discloses the idea of notifying database management systems (DBMS) on other host processors that one of the DBMS has encountered an error. (col 2, lines 36-43). However, Tandon is silent on the means used to identify the host processors to be notified. The closest Tandon comes to discussing this means is by noting that a broadcast message is sent to the other processors in the environment. (col 5, lines 23-26). This does not teach or suggest the use of one or more lists of system resources. This merely teaches the idea that broadcast messages may be sent to processors. Therefore, Applicants respectfully submit that the rejection of claim 2 is thereby traversed.

Claim 3 stands rejected over Tandon because the Office Action states that Tandon teaches storing lists as linked lists, as indicated by the Office Action in Fig. 1, element 10 and Col 3, lines 20-38. Fig. 1, element 10 is a block diagram of a processing unit in a multi-host processing system. This processing unit is a hardware element that processes several software modules, indicated by the various blocks within the processor 10. Nothing in Fig. 1 or the associated disclosure teaches maintaining any sort of list of system resources, much less storing such lists as linked lists. The cited text at col. 3, lines 20-38 is a discussion of the various hardware elements that comprise the data processing system of Tandon. The relationships between the hardware elements, including the way they are coupled together, is discussed there. However, nothing is said about maintaining any lists of resources, whether in linked list or any other form. Therefore, Applicants respectfully submit that Tandon does not teach the idea of using linked lists to store a list of system resources, and that the rejection of claim 3 is therefore traversed.

Claim 5 stands rejected over Tandon because Tandon allegedly teaches processing entities comprising processes categorized into process types. Fig. 2, steps 54-68 are cited by the Examiner for this proposition. Fig. 2 is directed, however, to a method for handling errors. The errors are categorized into error types, based upon the severity of the error encountered. The more severe errors trigger the notification of other hosts and the storage of a dump file. (Fig. 2, steps 64-68). Minor errors are merely reported to the user (steps 54-60). Nothing in this error handling method discusses the nature of the processing entities themselves, nor does this method teach the idea of categorizing processes into process types. Applicants therefore respectfully submit that the rejection of claim 5 is traversed.

Claim 6 stands rejected over Tandon because the Office Action states that Tandon teaches preserving the state of one or more system resources by suspending the state of one or more processes. Tandon does teach the idea of suspending execution of a specialized Receiver Process, for the purpose of insuring that there will always be a Receiver Process available to receive a message from a Record Lock Process (RLP). (col 6, lines 53-62). However, Tandon does not teach or suggest the idea of suspending the execution of a process for the purpose of preserving the state of that process for diagnosing failures. Tandon teaches that the way to diagnose failures is by copying the contents of these resources into dump files, not by preserving resources in the computer system

itself. Therefore, Tandon teaches away from the idea of preserving the state of system resources for failure diagnosis by suspending their execution. Applicants respectfully submit that the rejection of claim 6 is thereby traversed.

Claim 7 stands rejected over Tandon because Tandon allegedly teaches suspending processes by entering them into an idle loop. As an initial matter, Applicants have amended claim 7 to correct a typographical error in the word "ide", which should read "idle". It is submitted that no new matter is added by this amendment and that this amendment is not made for reasons related to patentability. Tandon teaches that Receiver Processes are held idle until a message is received from the RLP. (col. 4, lines 3-10). Tandon, however, teaches no particular method for holding processes idle. In particular, Tandon does not teach or suggest the idea of holding a process idle by causing the process to enter into an idle loop. Tandon merely teaches that processes can be held idle. Therefore, Applicants respectfully submit that the rejection of claim 7 is traversed.

Claim 8 stands rejected over Tandon because Tandon allegedly teaches suspending processes using an operating system scheduler. The Record Lock Processor (RLP) used to suspend the Receiver Processes of Tandon, as noted by the Examiner, is a functional unit that coordinates locks on files, blocks, etc. associated with the storage system, between the various applications on the various host processors. (col 3., lines 38-43) The RLP is essentially a storage system access scheduler, not an operating system scheduler. Therefore, Applicants respectfully submit that Tandon does not teach suspending processes using an operating system scheduler, and the rejection of claim 8 is thereby traversed.

Claim 9 stands rejected over Tandon because Tandon allegedly teaches selecting processes to suspend based upon their process type. The Receiver Processes of Tandon are all suspended as soon as they are started and have registered themselves with the RLP. (col. 6, line 63 – col. 7, line 4). The Receiver Processes are each awakened again as messages are received, whereupon another Receiver Process is started and suspended. (col. 7, lines 5-10). Tandon is silent on the particular means used to determine which process to awaken. In any event, there is no selection made of which processes to suspend, based on any criteria at all. All Receiver Processes are suspended. Therefore, Applicants respectfully submit that Tandon does not teach any methods of selecting which processes to suspend, and the rejection of claim 9 is therefore traversed.

Claim 11 stands rejected over Tandon because Tandon allegedly teaches that the system resources comprise redundant hardware/software components. As noted by the Examiner, Tandon does teach the use of multiple host processors in a computing environment. However, these host processors are not provided to create any redundancy in the components of the computing environment. These processors are provided to allow for faster processing of data, by allowing multiple processors to work on the shared data in the mass storage. (col. 3, lines 20-37). No mention is made anywhere in Tandon of incorporating redundant hardware/software components into the second set of system resources, much less the idea of using redundant components to facilitate the preservation and diagnosis of failures. Applicants therefore respectfully submit that Tandon does not teach the use of redundant hardware/software components in a method of diagnosing a computer system after a failure, and the rejection of claim 10 is thereby traversed.

Claim 12 stands rejected over Tandon, in view of Chung and an "Official Notice". Firstly, the Examiner notes that Tandon teaches diagnosing the failure by analyzing one or more resources from the first set of resources. The disclosure in Tandon, however, teaches diagnosing a failure by copying or recording the contents of allocated memory to a file, and then performing an analysis on the copy stored in that file later on. (col 2, lines 40-49) Tandon does not teach the analysis of the resources themselves, by preserving them in the computer system the resources belong to. Therefore, Applicants respectfully submit that this rejection of Claim 12 is traversed.

Claim 12 also stands rejected over Tandon in view of Chung, because the Office Action states that the combined references teach the idea of using a second set of resources to access a first set of resources for the purpose of analyzing the first set of resources. Chung teaches the idea of having a backup computer system available to take over the running of applications from a primary computer, when the primary computer suffers a failure. Chung does not teach, however, the idea of using a second set of resources to access the first set of resources for purposes of analyzing the first set of resources. In Chung, the backup computer does no analysis of the primary computer. The backup computer merely takes over the processing of the data from the primary computer. Thus, Applicants respectfully submit that this rejection of Claim 12 is thereby traversed.

The Examiner also rejects Claim 12 by taking "Official Notice" of the fact that preserving the state of system resources is well-known in the art, and it would therefore be obvious to preserve

system resources for analysis, and then use the systems of Tandon and Chung to analyze the failure. As noted above, references such as Tandon and Chung merely teach copying the contents of system resources, rather than preserving the state of the actual system resources themselves as is claimed in claim 12. In the system of Tandon, once the state of the system resources has been recorded or copied into the dump file, the various system resources of the computer system proceed onwards in their normal operations. In the system of claim 12, the state of the various system resources is preserved in place, in the computer system itself. For example, processes are suspended, memory blocks are made un-writeable, registers are locked, etc., until an analysis can be done of the actual, original resources themselves, to determine the nature of the failure. This idea is not taught by Tandon or Chung, and Applicants respectfully submit that this idea is not well-known in the art, that it therefore would not have been obvious to combine the teachings of Tandon and Chung with this idea, and that this rejection of Claim 12 is thereby traversed.

Claim 13 stands rejected over Tandon and Chung for the same reasons as Claim 12. Tandon, however, does not disclose the use of redundant system components. The closest that Tandon comes is in teaching the use of multiple hosts to process data. (col. 3, lines 20-37) However, these hosts are used to speed processing of data on a shared storage device, not to provide redundancies in case of errors. Chung teaches the idea of switching from a primary to a backup computer system in the event of a failure. Chung does not, however, teach the idea of maintaining a system component with built-in redundancy, and allowing control of that component to be switched from the primary to the backup computer system. Thus neither Tandon nor Chung teach the idea of maintaining a redundant system component for the first computer system, and shifting control of the redundant system component to the second computer system after the failure. Therefore, Applicants respectfully submit that the rejection of claim 13 is thereby traversed.

Claim 14 stands rejected over Tandon, because Tandon allegedly teaches that the redundant system component comprises a disk drive. As noted above for claim 13, Tandon does not teach the use of redundant system components, therefore Tandon cannot teach the use of a redundant, or mirrored, disk drive as a redundant component. The system of Tandon does contain disk drives, but there is not mention of the use of redundant disk drives. Even if Tandon were to be read to include redundant disk drives, there is no suggestion that such drives could be used to help preserve the state

of system resources, as is claimed by Claim 14. Tandon teaches diagnosing failures by saving and analyzing static dump files. Claim 14 teaches diagnosing failures by preserving and analyzing system resources on the computer system. Therefore Applicants respectfully submit that the rejection to Claim 14 is traversed.

Claim 15 stands rejected over Tandon because Tandon allegedly teaches one or more resources comprising processing entities. Applicants respectfully submit that the traversal of the rejection to claim 12, the parent claim of claim 15, renders claim 12 in allowable form. Thus, since claim 15 depends from a claim submitted to be allowable, the rejection to claim 15 is respectfully traversed.

Claim 16 stands rejected over Tandon because Tandon allegedly teaches one or more processing entities comprising processes. Applicants respectfully submit that the traversal of the rejection to claim 15, the parent claim of claim 16, renders claim 15 in allowable form. Thus, since claim 16 depends from a claim submitted to be allowable, the rejection to claim 16 is respectfully traversed.

Claim 17 stands rejected over Tandon because Tandon allegedly teaches preserving the state of one or more system resources by suspending the state of one or more processes. Tandon does teach the idea of suspending execution of a specialized Receiver Process, for the purpose of insuring that there will always be a Receiver Process available to receive a message from a Record Lock Process (RLP). (col 6, lines 53-62). Tandon does not teach or suggest the idea of suspending the execution of a process for the purpose of preserving the state of that process for diagnosing failures. Tandon teaches that the way to diagnose failures is by copying the contents of these resources into dump files, not by preserving resources in the computer system itself. Therefore, Tandon teaches away from the idea of preserving the state of system resources for failure diagnosis by suspending their execution. Applicants respectfully submit that the rejection of claim 17 is thereby traversed.

Claim 18 stands rejected over Tandon because the Office Action states that Tandon teaches suspending processes by entering them into an idle loop. Tandon teaches that Receiver Processes are held idle until a message is received from the RLP. (col. 4, lines 3-10). Tandon, however, teaches no particular method for holding processes idle. In particular, Tandon does not teach or suggest the idea of holding a process idle by causing the process to enter into an idle loop. Tandon

merely teaches that processes can be held idle. Therefore, Applicants respectfully submit that the rejection of claim 18 is traversed.

Claim 19 stands rejected over Tandon because the Office Action states that Tandon teaches suspending processes using an operating system scheduler. The Record Lock Processor (RLP) used to suspend the Receiver Processes of Tandon, as noted by the Examiner, is a functional unit that coordinates locks on files, blocks, etc. associated with the storage system, between the various applications on the various host processors. (col 3., lines 38-43) The RLP is essentially a storage system access scheduler, not an operating system scheduler. Therefore, Applicants respectfully submit that Tandon does not teach suspending processes using an operating system scheduler, and the rejection of claim 19 is thereby traversed.

Claim 20 stands rejected over Tandon because the Office Action states that Tandon teaches suspending processes using an operating system scheduler and selecting a process based on a process type. Applicants respectfully submit that the traversal of the rejection to claim 12, the parent claim of claim 20, renders claim 12 in allowable form. Thus, since claim 20 depends from a claim submitted to be allowable, the rejection to claim 20 is respectfully traversed.

Claim 21 stands rejected over Tandon, in view of Chung and an "Official Notice". Firstly, the Examiner notes that Tandon teaches diagnosing the failure by analyzing one or more resources from the first set of resources. The disclosure in Tandon, however, teaches diagnosing a failure by copying or recording the contents of allocated memory to a file, and then performing an analysis on the copy stored in that file later on. (col 2, lines 40-49) Tandon does not teach the analysis of the resources themselves, by preserving them in the computer system the resources belong to. Therefore, Applicants respectfully submit that this rejection of Claim 21 is traversed.

Claim 21 also stands rejected over Tandon in view of Chung, because the Office Action states that the combined references teach the idea of using a second set of resources to access a first set of resources for the purpose of analyzing the first set of resources. Chung teaches the idea of having a backup computer system available to take over the running of applications from a primary computer, when the primary computer suffers a failure. Chung does not teach, however, the idea of using a second set of resources to access the first set of resources for purposes of analyzing the first set of resources. In Chung, the backup computer does no analysis of the primary computer. The

backup computer merely takes over the processing of the data from the primary computer. Thus Applicants respectfully submit that this rejection of Claim 21 is thereby traversed.

The Examiner also rejects Claim 21 by taking "Official Notice" of the fact that preserving the state of system resources is well-known in the art, and it would therefore be obvious to preserve system resources for analysis, and then use the systems of Tandon and Chung to analyze the failure. As noted above, references such as Tandon and Chung merely teach copying the contents of system resources. Claim 21, however, is directed to preserving the state of the actual system resources. In the system of Tandon, once the state of the system resources has been recorded or copied into the dump file, the various system resources of the computer system proceed onwards in their normal operations. In the system of claim 21, the state of the various system resources is preserved in place, in the computer system itself. For example, processes are suspended, memory blocks are made un-writeable, registers are locked, etc., until an analysis can be done of the actual, original resources themselves, to determine the nature of the failure. This approach is not taught by Tandon or Chung, and Applicants respectfully submit that this idea is not well-known in the art, that it therefore would not have been obvious to combine the teachings of Tandon and Chung with this idea, and that this rejection of Claim 21 is thereby traversed.

Claim 22 stands rejected over Tandon, in view of Chung and an "Official Notice". Firstly, the Examiner notes that Tandon teaches diagnosing the failure by analyzing one or more resources from the first set of resources. The disclosure in Tandon, however, teaches diagnosing a failure by copying or recording the contents of allocated memory to a file, and then performing an analysis on the copy stored in that file later on. (col 2, lines 40-49) Tandon does not teach the analysis of the resources themselves, by preserving them in the computer system the resources belong to. Therefore, Applicants respectfully submit that this rejection of Claim 22 is traversed.

Claim 22 also stands rejected over Tandon in view of Chung, because the combined references allegedly teach the idea of using a second set of resources to access a first set of resources for the purpose of analyzing the first set of resources. Chung teaches the idea of having a backup computer system available to take over the running of applications from a primary computer, when the primary computer suffers a failure. Chung does not teach, however, the idea of using a second set of resources to access the first set of resources for purposes of analyzing the first set of resources.

In Chung, the backup computer does no analysis of the primary computer. The backup computer merely takes over the processing of the data from the primary computer. Thus Applicants respectfully submit that this rejection of Claim 22 is thereby traversed.

The Examiner also rejects Claim 22 by taking "Official Notice" of the fact that preserving the state of system resources is well-known in the art, and it would therefore be obvious to preserve system resources for analysis, and then use the systems of Tandon and Chung to analyze the failure. As previously noted, references such as Tandon and Ching merely teach copying the contents of system resources to a dump file. Claim 22, however, is directed to preserving the state of the actual, original system resources themselves. In the system of Tandon, once the state of the system resources has been recorded or copied into the dump file, the various system resources of the computer system proceed onwards in their normal operations. In the system of claim 22, the state of the various system resources is preserved in place, in the computer system itself. For example, processes are suspended, memory blocks are made un-writeable, registers are locked, etc., until an analysis can be done of the actual, original resources themselves, to determine the nature of the failure. This idea is not taught by Tandon or Chung, and Applicants respectfully submit that this idea is not well-known in the art, that it therefore would not have been obvious to combine the teachings of Tandon and Chung with this idea, and that this rejection of Claim 22 is thereby traversed.

Applicants also add new claims 23-40, which depend from independent claims which are submitted to be in condition for allowance. Applicants also add system claims 41-60. It is respectfully submitted that new claims 23-60 are in proper form for allowance for the reasons stated above with respect to claims 1-22.

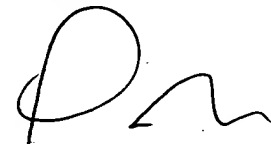
Conclusion

Applicants submit that the claims, as amended, are now in condition for allowance, which is respectfully requested. Nothing in this document shall act as an admission that any reference cited in the Office Action is prior art. Should the Examiner have any questions or comments, she is invited to call the undersigned Attorney at (408) 993-1555.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES

IN THE CLAIMS

7. The method of claim 6 in which the one or more processes to suspend are suspended by being entered into an idle loop.

Claims 23-60 are new.